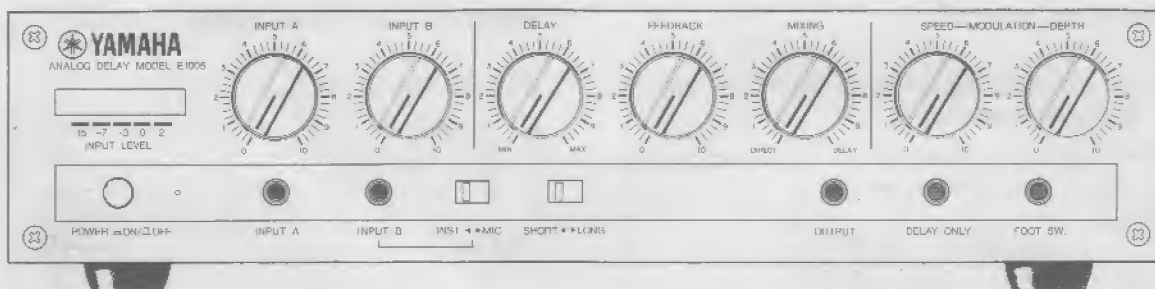


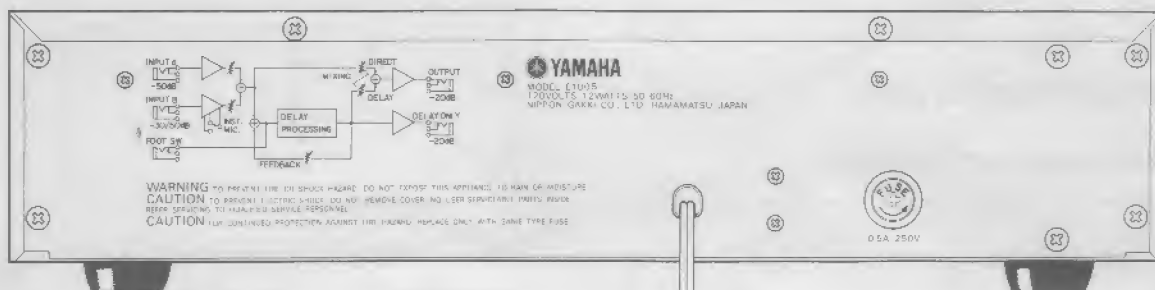
E1005

SERVICE MANUAL

FRONT PANEL



REAR PANEL



006417

SINCE 1887



YAMAHA

NIPPON GAKKI CO., LTD. HAMAMATSU, JAPAN

'79. Oct. 2.2K Y.S. Printed in Japan



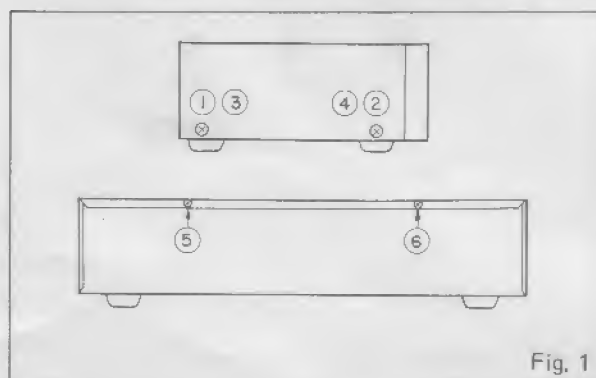
■CONTENTS

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■DISASSEMBLY PROCEDURES

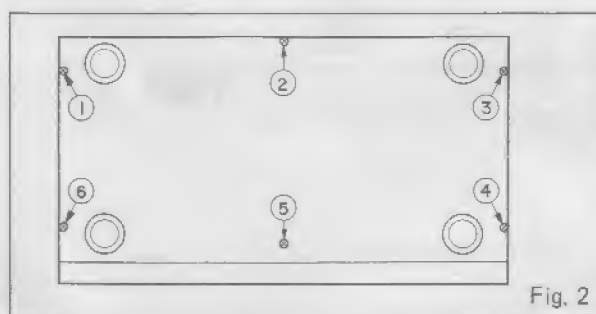
●REMOVAL OF TOP COVER

Remove screws ①, ② (Left), ③ ④ (Right) and ⑤ ⑥ (Rear Panel) (Fig. 1)



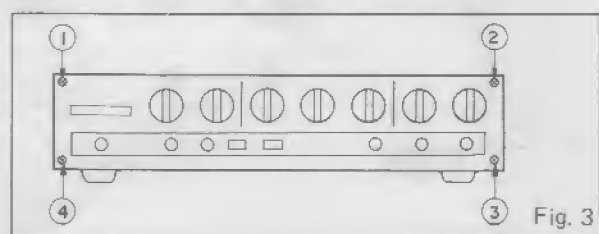
●REMOVAL OF BOTTOM COVER

Remove screws ① ~ ⑥ in Fig. 2.

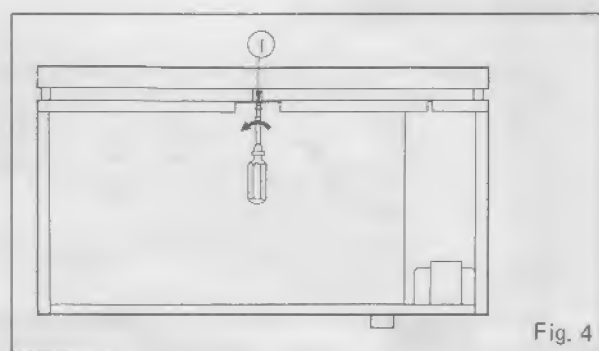


●REMOVAL OF FRONT PANEL

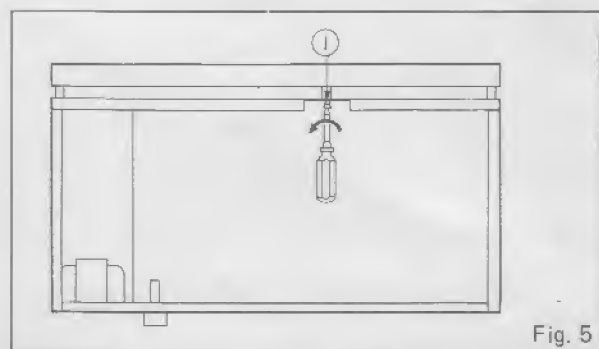
(1) Remove screws ① ~ ④ in Fig. 3.



(2) Remove screw ① in Fig. 4.



(3) Remove screw ① in Fig. 5.



■ADJUSTMENT

■ADJUSTING METHOD

As the test points are on the pattern-side, adjustment are performed from the pattern side (i.e., with the cover opened) as a rule.

■INSTRUMENTS USED FOR ADJUSTMENT

- | | |
|------------------------------|--|
| 1. Low frequency oscillator: | The sine wave is used. |
| 2. Oscilloscope: | Capable of measuring the time axis (X-axis). |
| 3. Milli-voltmeter: | It is suggested that two sets be used, one for input and the other for output. (dBm scale) |
| 4. Frequency counter: | Should be able to measure periods. (Extra-low frequency measurements) |
| 5. Distortion factor gauge: | 400Hz |
| 6. Tester: | For DC voltage measurements. |
| 7. Filter: | 12.47kHz, -6dB/oct. |

■BASIC SETTING

Unless specified otherwise, the controls and switches should be set as shown below. This setting is referred to as the basic setting.

INPUT A, INPUT B & DELAY 10 (Max.)
 FEEDBACK, MODULATION (SPEED, DEPTH)
 0 (Min.)
 MIXING DIRECT

1. CONFIRMATION OF POWER SUPPLY VOLTAGE

The power supply voltage should be within the ranges shown below.

- Between terminals +15V (TP18) and E (TP17)
 +15V±1V
- Between terminals -15V (TP19) and E (TP17)
 -15V±1V
- Between terminals +8V (TP20) and E (TP17)
 +8V±1V

2. CLOCK FREQUENCY ADJUSTMENT (at 2 points)

- Connect the frequency counter to TP11.
- With the SHORT/LONG switch positioned to the LONG side, Adjust VR2 so that the frequency will be $10.7 \pm 3\text{kHz}$. Then, turn the switch over to the SHORT side and adjust VR3 so as to bring the frequency within $27.3 \pm 0.3\text{kHz}$.

3. BBD BIAS ADJUSTMENT

- Connect the low frequency oscillator to the INPUT B terminal and the oscilloscope to TP12 (IC15 OUT).
- With the LEVEL switch set to INST., apply a 400Hz sine wave and gradually increase the output of the oscillator. While observing the oscilloscope, adjust VR4 so that the upper and lower waveforms will clip simultaneously.
- Next, connect the oscilloscope to TP13 (IC16 OUT), and perform adjustment in the same manner, using VR5.

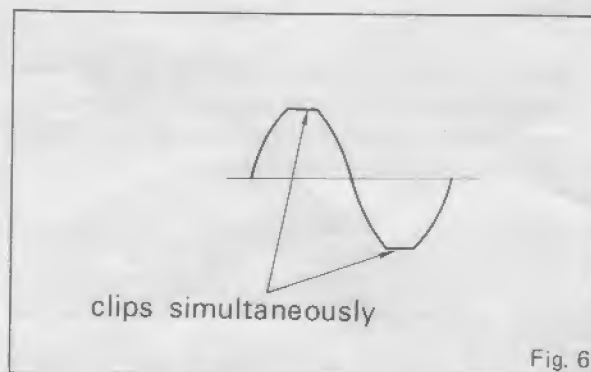


Fig. 6

4. BBD OUTPUT BALANCE ADJUSTMENT

This adjustment is carried out to minimize leakage of the clock components of the BBD IC output at TP13 (IC16 OUT) and TP14 (IC17 OUT) during no-signal input.

Connect the oscilloscope to TP13.

Turn the INPUT A and INPUT B controls down to minimum.

Adjust VR6 so that the clock waveform will become the smallest.

Then, connect the oscilloscope to TP14, and adjust in the same way, using VR7.

5. GAIN ADJUSTMENT

Connect the low frequency oscillator and milli-voltmeter to the INPUT B terminal, and a 10kΩ load resistor and milli-voltmeter to TP9 (DELAY ONLY terminal).

With the LEVEL switch set to INST, apply a sine-wave signal of 400Hz, -30dBm . Setting the SHORT/LONG switch to LONG, adjust VR8 so as to make the output level $-20\text{dB} \pm 0.5\text{dBm}$.

Next, turn the switch over to SHORT, and adjust VR9 so as to bring the output level similarly to $-20\text{dB} \pm 0.5\text{dBm}$.

6. LED LIGHTING LEVEL ADJUSTMENT

Under the same input conditions as "5", adjust VR1 so that, of the 5 LEDs arranged in series, 4 of them will illuminate one by one from the first one.

● CONFIRMATION OF ELECTRICAL PERFORMANCE

After adjustments have been completed, confirm that the following electrical performances can be obtained.

1. GAIN

When a 400Hz sine-wave signal is applied from INPUT A and INPUT B, an output of -20dBm shall be obtained at both OUTPUT and DELAY ONLY under the conditions listed below.

| | INPUT LEVEL | INPUT SW. | MIXING VOLUME DIRECT | OUTPUT MIXING VOLUME DELAY | | DELAY ONLY (DELAY SW. SHORT) |
|---------|-------------|-----------|----------------------|----------------------------|----------------|------------------------------|
| | | | | DELAY SW. SHORT | DELAY SW. LONG | |
| INPUT A | -50 | INST | -20 ± 2 | — | — | — |
| INPUT B | 30 | | -20 ± 2 | -20 ± 2 | -20 ± 2 | -20 ± 2 |
| | -50 | MIC | -20 ± 2 | — | — | — |

Table 1 Unit: $\text{dB}(\text{0dB} = 0.775\text{Vrms})$

2. FREQUENCY RESPONSE

2-1 DIRECT Frequency Response

When input signals the same as those shown in Table 1 are applied to INPUT A and INPUT B, the output frequency response obtained at the OUTPUT terminal shall be within the range of $0 \pm 1.5\text{dB}$ for between 50~10kHz, when 400Hz is taken as the reference level.

2-2 DELAY Frequency Response

With the set in the condition of "2-1", turn the MIXING control over to DELAY and apply a -30dBm sine-wave signal to INPUT B (INST). The output frequency response obtained at the OUTPUT terminal shall be within the range shown in

the following tables, when 400Hz is taken as the reference level.

When DELAY SW. is set to SHORT

| 50Hz | 5kHz |
|--------------|-------------|
| -1.0 ± 2 | 0.5 ± 2 |

Table 2 Unit: dB

When DELAY SW. is set to LONG

| 50Hz | 1kHz |
|--------------|-------------|
| -1.0 ± 2 | 1.8 ± 2 |

Table 3 Unit: dB

3. MAXIMUM OUTPUT

When a 400Hz sine-wave signal is applied from INPUT B (INST.) with the set in the basic setting, the total harmonic distortion factor (T.H.D.) shall be no more than 0.5% when the output level of OUTPUT is -3dBm . From this condition, turn the MIXING control to DELAY. The T.H.D. should be no more than 3% when the SHORT/LONG switch is positioned to SHORT, and no more than 5% when positioned to LONG.

In addition, the output waveform shall be free of such abnormalities as fragmented portions, or oscillation.

4. DELAY TIME

With the set in the basic-setting condition, and the MIXING control positioned to DELAY, delay time should be within the ranges listed in the following table.

| DELAY VOL. DELAY SW. | MIN | MAX |
|----------------------|---------------|------------------------|
| SHORT | 4ms. or less | $9.3\text{ms} \pm 5\%$ |
| LONG | 70ms. or less | $380\text{ms} \pm 5\%$ |

Table 4

5. NOISE LEVEL

5-1 DIRECT

Put the set in the condition of "basic setting". When the INPUT A and INPUT B terminals are short-circuited, the noise level should be no more than the values given in the following table under the conditions given therein.

| | | | | | |
|----------------|-----|-----|-----|------|-----|
| INPUT A VOLUME | MAX | MAX | MIN | MIN | MIN |
| INPUT B VOLUME | MAX | MIN | MAX | MAX | MIN |
| INPUT B SW. | MIC | — | MIC | INST | — |
| NOISE LEVEL | -81 | -84 | -84 | -90 | -92 |

Table 5 Unit: dB(0dB=0.775Vrms)

When measuring the noise level, a 12.47kHz, -6dB/oct filter for compensation is to be used.

5-2 DELAY

With the set in the condition of 5-1, turn the INPUT A control down to minimum, set the MIXING control to DELAY, the INPUT B switch to the INST-side and change the SHORT/LONG switch over from SHORT to LONG. The noise level in this condition should be no more than -90dBm.

6. LFO FREQUENCY

The oscillating frequency that appears at the TP15 terminal shall be within the range of 0.07~0.3Hz when the SPEED control is turned down to mini-

mum, and within 10~25Hz when turned up to maximum.

7. FET SWITCH

With the set in the basic-setting condition, apply a 400Hz, -30dBm sine wave from INPUT B (INST). When the FET switch is forced to turn off through the short-circuiting of the TP16 terminal, the output level appearing both at OUTPUT and DELAY ONLY should be -60dBm, or less.

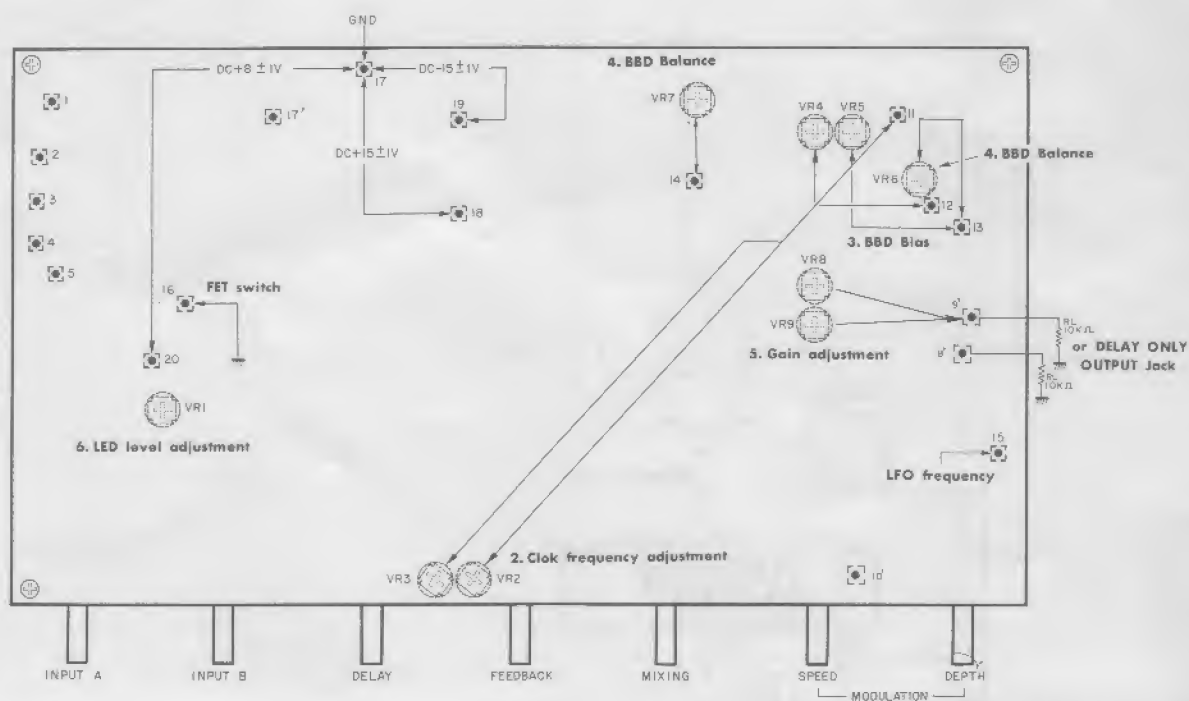
8. FOOT SWITCH

When, under the input conditions similar to those of "7", the MIXING control is set to DELAY and the FOOT SW to ON (or TP10 is short-circuited), the output level of both OUTPUT and DELAY ONLY should be -60dBm, or less.

9. POWER INDICATOR

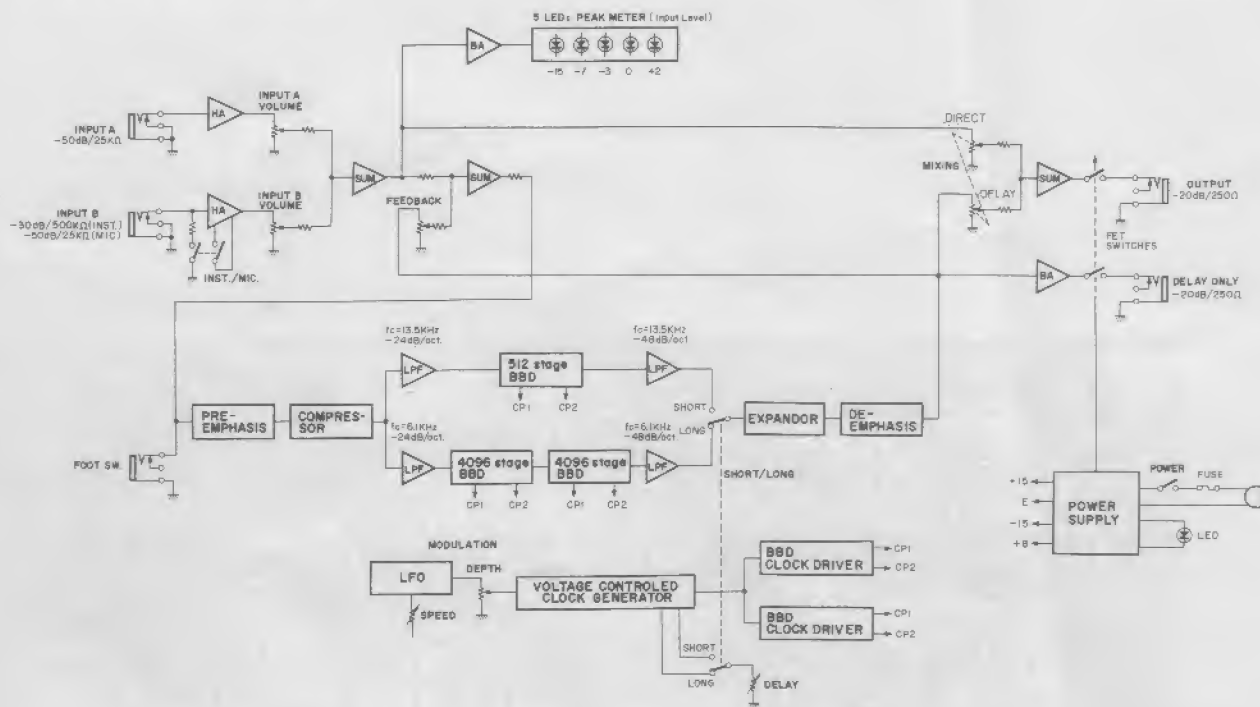
The POWER indicator LED should light up.

■ ADJUSTING POINTS



Note: Adjusting points on circuit Board as viewed from the pattern side.

BLOCK DIAGRAM



SPECIFICATIONS

| | |
|---|--|
| CONTROLS | |
| INPUT CONTROLS | INPUT A Vol., INPUT B Vol., Input level Switch: INST., 30dB IN, Z/MIC., 50dB-Lo-Z |
| DELAY CONTROLS | |
| MIXING Vol. (DIRECT, DELAY) | |
| DELAY Vol. | Delay Time Range Switch: (SHORT / LONG) |
| FEEDBACK Vol. | |
| MODULATION | |
| SPEED Vol. | |
| DEPTH Vol. | |
| Foot SW. (Phone Jack) | ON / OFF, LED Indicator |
| POWER Switch | 5 LEDs |
| INPUT LEVEL Meter | |
| OUTPUT (MIXING Vol.: DIRECT) | |
| TOTAL HARMONIC DISTORTION | Less than 0.3% -10dB/10kHz (20 to 20kHz) |
| INTERMODULATION DISTORTION | Less than 1.0% -10dB/10kHz (70Hz - 7kHz = 4:1) |
| FREQUENCY RESPONSE | 20 to 20kHz (+1, -3dB) -20dB/10kHz |
| * NOISE LEVEL | -110dB (equivalent input noise) |
| | -90dB INPUT A Vol. Max., INPUT B Vol. Min. |
| OUTPUT (MIXING Vol.: DELAY) / DELAY ONLY | |
| TOTAL HARMONIC DISTORTION | Less than 3% -10dB/10kHz (1-1kHz) |
| INTERMODULATION DISTORTION | Less than 5% (70Hz - 7kHz = 4:1) -20dB/10kHz, DELAY SW. SHORT |
| * NOISE LEVEL | -80dB INPUT A Vol. Max., INPUT B Vol. Min., DELAY SW. SHORT |
| | -80dB INPUT A Vol. Max., INPUT B Vol. Min., DELAY SW. LONG |
| Delay Time | 4 to 9ms, DELAY SW. SHORT, DELAY Vol. Min. to Max. |
| | 55 to 400ms, DELAY SW. LONG, DELAY Vol. Min. to Max. |
| MODULATION DEPTH | 0 to 10% SPEED, DEPTH Vol. Max., DELAY SW. SHORT |
| | 0 to 30% SPEED, DEPTH Vol. Max., DELAY SW. LONG |
| MODULATION-FREQUENCY | 0.5 to 10Hz SPEED Vol. Min. to Max. |
| OTHERS | |
| POWER SOURCE | U.S. and CANADIAN Models: 120V, 60Hz GENERAL Model: 110-120 / 220 240V, 50/60Hz |
| POWER CONSUMPTION | 12 Watts |
| DIMENSION (W x D x H) | 396 x 213 x 95mm (15-1/2 x 8-1/3 x 3-2/3") Includes rubber legs. |
| WEIGHT | 3.6kg (8 lb.) |

Note: * Compensated with 12.47kHz, -60dB/oct, filter.

INPUT TERMINALS

| CONNECTION | ACTUAL LOAD IMPEDANCE | FOR USE W/ NOMINAL | SENSITIVITY | INPUT LEVEL | |
|---------------|-----------------------|--------------------|-------------|-------------|------------------|
| | | | | NOMINAL | MAX. BEFORE CLIP |
| INPUT A | 25kΩ | 150 to 5kΩ | -50dB | -50dB | -22dB |
| INPUT B INST. | 500kΩ | 5kΩ | -30dB | -30dB | -2dB |
| INPUT B MIC. | 25kΩ | 150 to 5kΩ | 50dB | -50dB | -22dB |

* 0dB = 0.775Vrms

Terminals: Phone Jack (Unbalanced)

OUTPUT TERMINALS

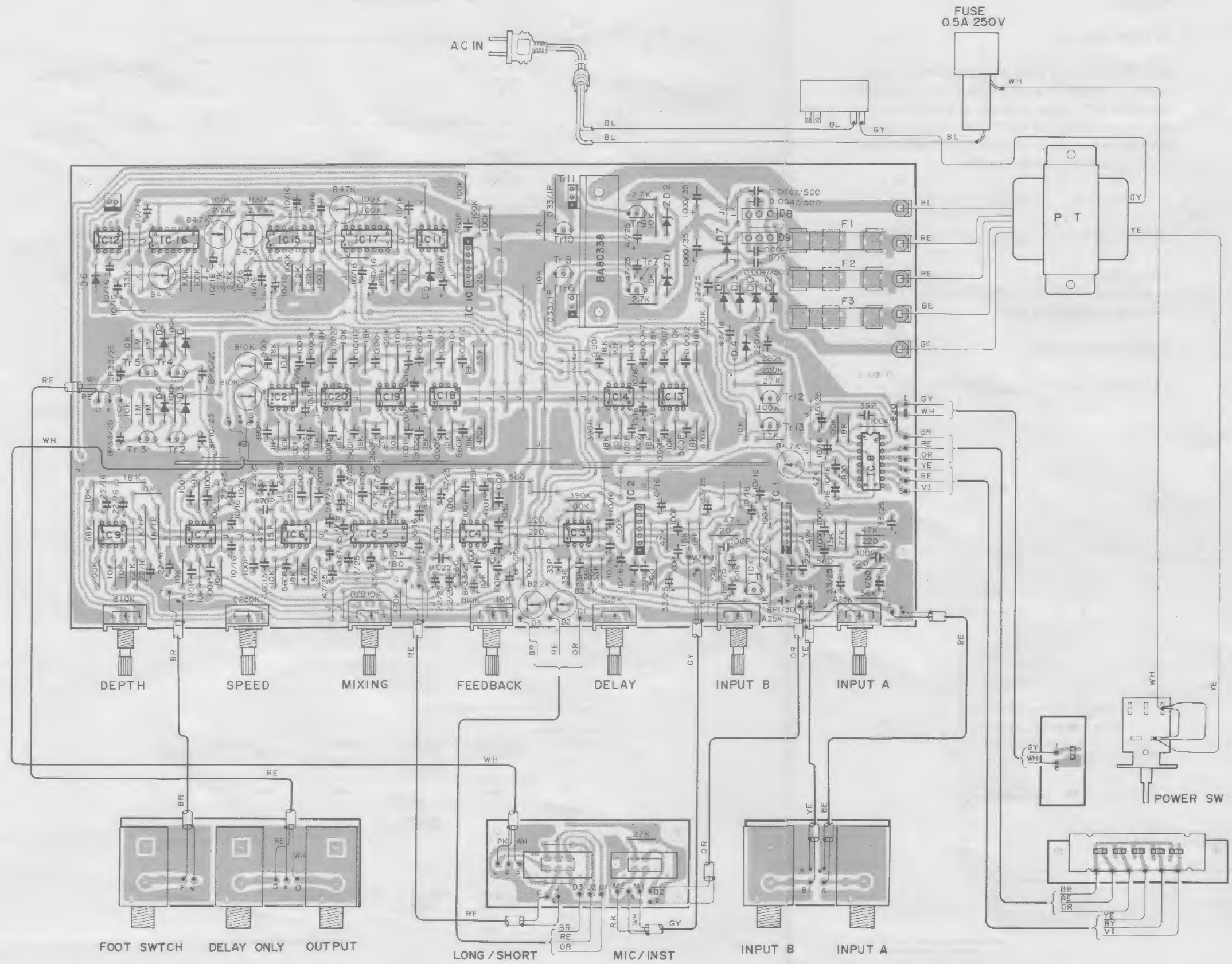
| CONNECTION | ACTUAL SOURCE IMPEDANCE | FOR USE W/ NOMINAL | OUTPUT LEVEL | |
|------------|-------------------------|--------------------|--------------|------------------|
| | | | NOMINAL | MAX. BEFORE CLIP |
| OUTPUT | 250Ω | 10kΩ | -20dB | -3dB |
| DELAY ONLY | 250Ω | 10kΩ | -20dB | -3dB |

* 0dB = 0.775Vrms

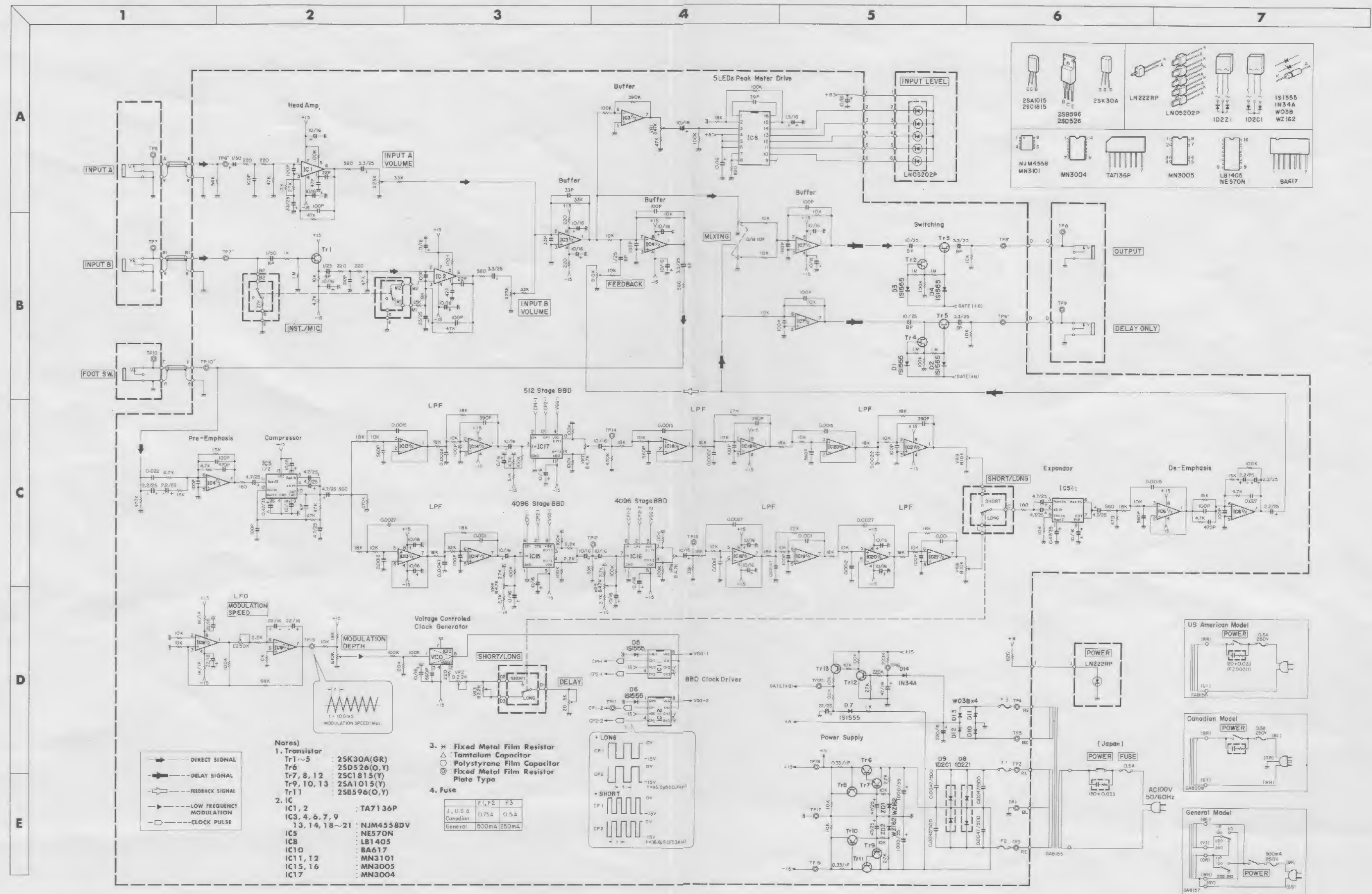
Terminals: Phone Jack (Unbalanced)

Specifications subject to change without notice.

WIRING

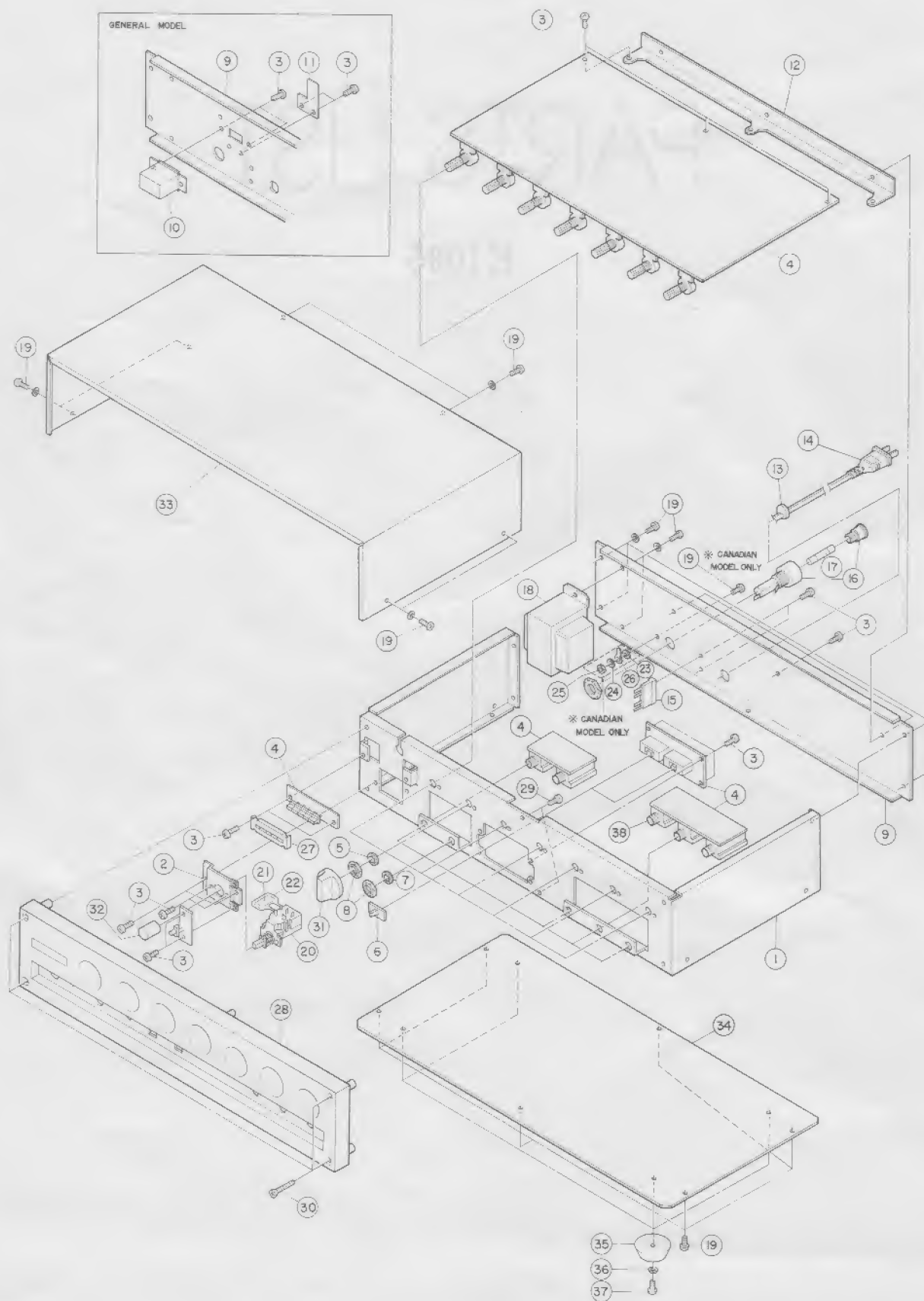


SCHEMATIC DIAGRAM



PARTS LIST

E1005



| Ref. No. | Part No. | Description | (部 品 名) | Remarks | Common model | Markets |
|----------|----------------------|--------------------------------|--------------|---------|--------------|---------|
| * 1 | 30 54 00 AA 81 16 00 | Chassis #81160 | シャーシー | | | |
| * 2 | 30 54 00 AA 81 20 40 | Holder, P.SW | P.SW 取付板 | | | |
| * 3 | 40 10 00 ED 33 00 60 | Bind Screw M3×6 FCM3-B | バインド小ネジ | | | |
| * 4 | 30 54 00 NA 80 54 80 | FM Board 1/8~5/8 | シート (FM) | J | | |
| * " | 30 54 00 NA 80 54 90 | " | " | C | | |
| * " | 30 54 00 NA 80 55 00 | " | " | G | | |
| * " | 30 54 00 NA 80 57 70 | " | " | U | | |
| 5 | 40 10 00 EV 41 00 70 | Toothed Lock Washer A7S ZMC2-Y | 歯付座金 | | | |
| 6 | 30 10 00 CB 81 46 80 | Knob #81403 | ツマミ | | CS-40M | |
| 7 | 40 10 00 EV 41 00 90 | Toothed Lock Washer A9S ZMC2-Y | 歯付座金 | | | |
| 8 | 40 10 00 LX 20 00 20 | Hexagonal Nut 9S FNM3 | 特殊六角ナット | | | |
| * 9 | 30 54 00 AA 81 16 10 | Rear Panel #81161 | リアパネル | J | | |
| * " | 30 54 00 AA 81 16 20 | " #81162 | " | U | | |
| * " | 30 54 00 AA 81 16 30 | " #81163 | " | C | | |
| * " | 30 54 00 AA 81 16 40 | " #81164 | " | G | | |
| 10 | 40 10 00 KA 40 04 10 | Slide Switch ESD-39 #40041 | スライドSW | G | | |
| 11 | 40 10 00 CB 81 42 50 | Stopper #81425 | ストッパー | G | | |
| * 12 | 30 54 00 AA 81 20 50 | Holder, Board | シートホルダー | | | |
| 13 | 40 10 00 CB 06 86 30 | Cord Stopper #06863 | コードストッパー | J | | |
| " | 40 10 00 CB 80 68 50 | " #80685 | " | C | | |
| " | 40 10 00 CB 07 27 50 | " #07275 | " | U,G | | |
| 14 | 40 10 00 MG 00 06 00 | AC Cord #00060 | 電源コード | J | | |
| " | 40 10 00 MG 00 02 70 | " #00027 | " | C | | |
| " | 40 10 00 MG 00 08 90 | " #00089 | " | U | | |
| " | 40 10 00 MG 00 08 60 | " #00086 | " | G | | |
| 15 | 40 10 00 LA 00 07 60 | Lug Terminal CV-2 #00076 | カラー端子板 | | | |
| 16 | 40 10 00 LB 20 04 90 | Fuse Holder SN-2052 #20049 | ヒューズホルダー | J,U,C | | |
| " | 40 10 00 LB 20 05 90 | " FEB 031-1401 #20059 | " | G | | |
| 17 | 40 10 00 KB 00 03 10 | Fuse 0.5A 250V | ヒューズ | J | | |
| " | 40 10 00 KB 00 10 10 | " UL(SS-2) 0.5A 250V | " | U,C | | |
| " | 40 10 00 KB 00 07 10 | " 500mA 250V | " | G | | |
| * 18 | 40 10 00 GA 81 55 00 | Power Transformer | トランス | J | | |
| * " | 40 10 00 GA 81 56 00 | " | " | U | | |
| * " | 40 10 00 GA 81 57 00 | " | " | G | | |
| * " | 40 10 00 GA 82 08 00 | " | " | C | | |
| * 19 | 40 10 00 ED 34 00 80 | Bind Screw M4×8 FCM3-B | バインド小ネジ | | | |
| 20 | 40 10 00 KA 80 02 20 | Push Switch SDG5P | プッシュSW | J | | |
| " | 40 10 00 KA 80 02 00 | " SDG5P001 | " | U,C | | |
| " | 40 10 00 KA 80 06 90 | " SDG5P-E | " | G | | |
| 21 | 40 10 00 FZ 00 01 10 | Spark Killer Capacitor | スパークキラーコンデンサ | J,U | | |
| " | 40 10 00 FZ 00 09 50 | " | " | C | | |
| 22 | 40 10 00 CB 07 98 90 | Cover for Capacitor | コンデンサカバー角型 | C | | |
| " | 40 10 00 CB 07 21 90 | " | " | J,U | | |
| 23 | 40 10 00 EV 41 00 40 | Toothed Lock Washer A4S ZMC2-Y | 歯付座金 | C | | |
| 24 | 40 10 00 EV 30 00 40 | Spring Washer 4S ZMC2-Y | バネ座金 | C | | |
| 25 | 40 10 00 EV 10 00 40 | Hexagonal Nut M4 ZMC2-Y | 六角ナット | C | | |
| 26 | 40 10 00 LA 00 02 90 | Lug Terminal | アースラグ | C | | |
| * 27 | 30 54 00 CB 81 43 10 | Plate, LED | LEDプレート | | | |
| * 28 | 30 54 00 CB 81 43 00 | Panel #81430 | パネル | | | |
| 29 | 40 10 00 Ei 34 01 00 | Bind Tapping Screw 4×10 FCM3-B | バインドタッピングネジ | | | |
| 30 | 40 10 00 EF 34 03 50 | Oval Head Screw M4×35 FCM3-B | 丸皿小ネジ | | | |
| 31 | 30 54 00 CB 81 23 70 | Knob #81237 | ツマミ | | E1010 | |
| 32 | 30 54 00 CB 06 65 10 | Push Button #06651 | プッシュボタン | | PM700 | |

* : New Part (新部品) J : Japan, G : General, U : U.S.A, C : Canadian

| Ref. No. | Part No. | Description | (部 品 名) | Remarks | Common model | Markets |
|----------|-----------------------|------------------------------------|-------------|-----------------|--------------|---------|
| ※ 33 | 30 54 00 AA 81 16 50 | Top Cover #81165 | トップカバー | | | |
| ※ 34 | 30 54 00 AA 81 20 60 | Bottom Cover #81206 | 底板 | | | |
| 35 | 40 50 00 CB 80 12 70 | Leg | ゴム脚 | | PM 300 | |
| 36 | 40 10 00 EV 20 30 40 | Flat Washer 4S ZMC2-B | 平座金 | | | |
| 37 | 40 10 00 ED 34 01 00 | Bind Screw M4×10 ZMC2-B | バインド小ネジ | | | |
| 38 | 40 10 00 LB 10 05 00 | Phone Jack | 基板型ホーンジャック | | | |
| | | | | | | |
| ※ | 30 54 00 NA 80 54 80 | FM Board | FMシート | J | | |
| ※ | 30 54 00 NA 80 54 90 | " | " | C | | |
| ※ | 30 54 00 NA 80 55 00 | " | " | G | | |
| ※ | 30 54 00 NA 80 57 70 | " | " | U | | |
| | 30 54 00 AA 03 99 10 | Metal for P.C.B | 反り止め金具 | | | |
| | 30 54 00 BA 80 33 80 | Heat Sink | 放熱板 | | E1010 | |
| | 30 54 00 CB 07 28 80 | Isulation Bush | 絶縁ブッシュ | | | |
| ※ | 30 54 00 CB 81 43 20 | LED Holder | LEDホルダー | | | |
| | 40 10 00 EL 02 80 80 | Sems Screw 2.6×8 ZMC2-Y | セムス小ネジ | | | |
| | 40 10 00 E1 03 00 80 | Bind Tapping Screw 3×8 ZMC2-Y | バインドタッピングネジ | | | |
| | 40 10 00 EV 41 00 30 | Toothed Lock Washer 3S | 歯付座金 | | | |
| | 40 10 00 FD 11 25 60 | Polystyrene Film Capacitor 560PF | スチコン | | | |
| | 40 10 00 HL 31 23 30 | Metal Oxide Film Resistor 0.33Ω 1P | 酸化抵抗 | | | |
| | 40 10 00 HL 31 61 00 | " 1K 1P | " | | | |
| ※ | 40 10 00 HS 31 09 10 | Variable Resistor D/B 10K | ロータリーボリューム | | | |
| | 40 10 00 HS 31 04 90 | " A25KΩ | " | | E1010 | |
| | 40 10 00 HS 31 05 00 | " B10KΩ | " | | " | |
| | 40 10 00 HS 31 05 20 | " C250KΩ | " | | " | |
| | 40 10 00 HS 31 05 30 | " ZD5KΩ | " | | " | |
| | 40 10 00 HT 41 00 30 | Variable Resistor B2.2KΩ | ソリッドボリューム | | | |
| | 40 10 00 HT 41 00 40 | " B4.7KΩ | " | | | |
| | 40 10 00 HT 41 00 70 | " B10KΩ | " | | | |
| | 40 10 00 HT 41 01 40 | " B47KΩ | " | | | |
| | 40 10 00 HU 57 64 70 | Metal Film Resistor 4.7KΩ | 金属皮膜抵抗 | | | |
| | 40 10 00 HU 57 65 10 | " 5.1KΩ | " | | | |
| | 40 10 00 HW 79 52 20 | Plate Resistor 220Ω 33mA | プレート抵抗 | | | |
| | 40 10 00 i A 10 15 20 | Transistor 2SA1015(Y) | トランジスタ | | | |
| | 40 10 00 i B 05 96 30 | " 2SB596(O,Y) | " | | | |
| | 40 10 00 i C 18 15 20 | " 2SC1815(Y) | " | | | |
| | 40 10 00 i D 05 26 30 | " 2SD526(O,Y) | " | | | |
| | 40 10 00 i E 00 00 20 | FET 2SK30A(GR) | FET | | | |
| | 40 10 00 i F 00 00 10 | Diode 1N34A | ダイオード | | | |
| | 40 10 00 i F 00 00 40 | " 1S1555 | " | | | |
| | 40 10 00 i F 00 06 50 | Zener Diode WZ162 | ツェナーダイオード | | | |
| ※ | 40 10 00 i F 00 17 20 | LED LN222RP | LED | | | |
| ※ | 40 10 00 i F 00 17 30 | " LN05202P | " | | | |
| | 40 10 00 i G 00 12 20 | IC TA7136P | IC | Pre Amp. | | |
| | 40 10 00 i G 00 13 90 | " NJM4558 DV | " | OP. Amp | | |
| | 40 10 00 i G 00 14 10 | " BA617 | " | VCG | | |
| | 40 10 00 i G 02 54 00 | " MN3004 | " | BBD | E1010 | |
| | 40 10 00 i G 03 12 00 | " MN3005 | " | BBD | " | |
| | 40 10 00 i G 03 13 00 | " NE570N | " | Compander | " | |
| | 40 10 00 i G 03 14 00 | " LB1405 | " | Level meters IC | " | |
| ※ | 40 10 00 i G 03 75 00 | " MN3101 | " | CP Generator | | |
| | 40 10 00 i H 00 02 80 | Diode 1D2C1 | ダイオード | | | |

※ : New Part (新部品)